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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,499	07/01/2003	Jong-Jin Lee	053933-5046	1723

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EXAMINER

HA, NATHAN W

ART UNIT PAPER NUMBER

2814

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/609,499

Applicant(s)

LEE ET AL.

Examiner

Nathan W. Ha

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 7-9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imasu et al. (US 6,208,525, previously cited, hereinafter, Imasu) and in view of Iijima et al. (US 2003/0011070, previously cited, hereinafter, Iijima.)

In regard to claims 7 and 8, in fig. 2, Imasu discloses a package substrate, comprising:

a base substrate 2, or rigid board (col. 4, lines 19-20) formed with a plurality of through holes (not numbered), wherein the elements 2C are embedded therein;

a first copper layer 2A, or wiring line, (col. 4, lines 31-32 and lines 38-40) plated predetermined portions of the through holes;

a pattern layer 4C or 4A (col. 4, lines 28-30) formed on the first copper layer;

wire bonding pads 22, or lead, (col. 4, line 49) formed on predetermined portions of the pattern layer at an upper surface of the base;

solder ball pads 2B, or electrode pads (col. 4, line 34) formed on predetermined portions of the pattern layer at a lower surface of the base substrate; and

a solder resist 5 and 6, or passivation layer (col. 4, line 45) covering the base substrate and the pattern layers. The solder resist has first portion contacting the upper surface of the substrate and a second portion contacting the lower surface of the substrate and solder pads. See also, fig. 5.

Imasu further discloses that some electrical connection elements are made of gold, for example, electrical connection element 15, or bump electrode (col. 8, line 20). Imasu, however, does not expressly disclose the connection pads and wiring pads are made of gold. It should be noted that gold material is widely use for its well known high conductivity and better contact since gold prevent the oxidation from oxygen. For instance, Iijima, in fig. 2, discloses an analogous package 20 including a substrate 21 with through hole (section [0035], lines 1-8), wiring layers 25 (section [0035], lines 9-10), pad connections pads 33 formed on top and bottom of the substrate, which made of gold (section [0036], lines 1-4) in order to have a better electrical contact between devices and prevent the pads from oxidation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to substitute gold material for the pad connections as taught by Iijima in Imasu's invention in order to provide electrical contact since gold has high conductivity constant and prevent damage from oxidation.

Imasu does not explicitly teach that the copper layers are made by plated, electrolytic Au plating process. However, the limitations "plated, electrolytic Au plating, electroless plated, and serves as a plating lead line, and CCL (claim12), and newly added 'removed step' " in claims 7-9 and 11-13 are taken to be a product by process

limitation, it is the patentability of the claimed product and not of recited process steps which must be established.

Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process " claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Furthermore, the newly added limitation, "which serves as a plating lead line" is a functional limitation. The copper layer as taught by Isamu inherently performs the same function since it is made of the same material and in a structure which is analogous to the structure as claimed.

In regard to claims 8-11, as mentioned above pattern and electrode layers are made of copper, and AU plating is in fact a product by process limitation (see above discussion).

In regard to the limitation "plated", as addressed above, this is a product by process limitation. Please above discussion regarding to claims 7-9, and 11, wherein the product by process limitations are clearly addressed.

In regard to claim 14, the second copper fills the through holes, fig. 2.

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imasu and Iijima as applied to claims 7-9 and 11 above.

In regard to claim 10, Imasu discloses all of the claimed limitation as mentioned above, except the thickness of the plated layer having a thickness of 0.5 to 1.5 μm .

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the thickness of the above layer because applicant has not disclosed that thickness provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected applicant's invention to perform equally well with either shape because they perform the same function of connecting the module through the substrate to the solder balls electrically.

Therefore, it would have been obvious to one of ordinary skill in the art to modify Imasu to obtain the invention as specify in the above claim.

Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed.

Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) .

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Response to Arguments

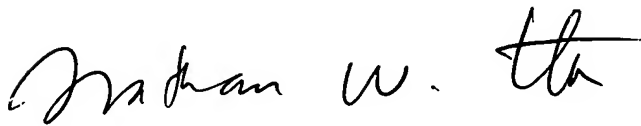
4. Applicant's arguments filed 9/26/05 have been fully considered but they are not persuasive. As mentioned above, the newly added limitation, "which serves as a plating lead line", is in fact a functional limitation; it does not carry patentable weight. The copper layer as cited may perform the same functions as the claimed copper layer since it is formed of the same material and in a semiconductor package which is an analogous device with the package as claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (571) 272-1707. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Nathan W. Ha". The signature is fluid and cursive, with a large initial "N" and a stylized "H".

Nathan Ha
May 18, 2005